

## NEW CHROMOSOME COUNTS IN ULMUS AND PLATANUS

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*Ulmus* and *Platanus* are among the genera that have been given high priority in the project on Selection and Breeding of Shade and Ornamental Trees, begun at the U.S. National Arboretum in 1967. As part of an over-all genetics research program, we have attempted to obtain cytological data on all trees used for breeding and observation. Some of the plants are seedlings grown from seed obtained from native sources while others are older, established trees. This paper is primarily a report on the chromosome numbers of elm and plane species and varieties which have not been previously noted in the literature. The methods used in this study were standard aceto-carmin squash techniques with either root tips or pollen mother cells.

Voucher specimens of Arboretum trees, parent trees from which seed was collected, and seedling progenies are on deposit in the herbarium of the National Arboretum.

### ULMUS

The first report on elm chromosome numbers was made by Krause (1930), who determined the haploid number in *U. montana* With. (*U. glabra* Huds.) to be  $n = 14$ . Krause (1931) also found  $n = 14$  in *U. campestris* L. (*U. carpiniifolia* Gleditsch.) and  $2n = 28$  in *U. americana* Willd. Walker (1932) reported a different haploid number ( $n = 15$ ) for *U. pumila* L. and *U. fulva* Michx. (*U. rubra* Michx.). She also determined the number of *U. americana* L. to be  $n = 28$  or  $n = 30$ , and ascribed the difference to variation between trees. Later work, including that of Sax (1933a), has shown that 14 is indeed the normal haploid (and probably basic) chromosome number in elms and that most species are diploid with  $2n = 28$ . On the subject of *U. americana* L., Sax reported both the normal and pendulous forms as tetraploids with  $n = 28$ .



In the most recent edition of the "Chromosome Atlas" (Darlington and Wylie, 1955), two chromosome numbers are listed for *U. americana*. The diploid count of  $2n = 28$  is ascribed to Krause (1930) — it should be Krause (1931) — while the reference for the tetraploid number is Sax (1933a). The question immediately arises as to whether the "*U. americana*" of the Krause study was the same species that Linnaeus described. Willdenow is given by Krause as the authority for the scientific name; and since Krause obtained his material as seed or seedlings from a commercial firm, the problem of identification is more difficult. In view of past and present cytological studies on *U. americana* L., it appears likely that Krause's plants were not true American elm and that his diploid count may be eliminated from further consideration.

Recent studies in American elm, along with other elm species, are reported below.

*U. americana* L.  $n = 28$

Five trees (ST-324, 331, 334, 336, 341) growing at the National Arboretum. Received as seedlings from U.S. Soil Conservation Service, Manhattan, Kansas in March, 1954.

The author has previously determined native trees in Massachusetts and Pennsylvania to be tetraploids.

*U. americana* var. *floridana* (Chapm.) Little  $2n = 56$

Seedlings raised from seedlot NST-44, collected by A. E. Squillace, U.S. Forest Service, in Fort White, Florida, in March, 1968.

*U. alata* Michx.  $2n = 28$

Seedlings raised from seedlot NST-45, collected by A. E. Squillace, U.S. Forest Service, in O'Leno Park, Florida, in March, 1968.

*U. crassifolia* Nutt.  $2n = 28$

Seedlings raised from seedlot NST-8, collected by L. Hinton, Jr. from native trees in Houston, Texas, in November, 1967.

*U. macrocarpa* Hance  $n = 14$

Tree ST-370 growing at National Arboretum. One of five surviving trees raised from seedlots (P.I. 138008-



138017) received in 1940 from garden of Summer Palace, Peiping, China.

*U. parvifolia* Jacq.  $n = 14$

Tree ST-300 of accession NA 25526. Received in 1929 as P.I. 82487 from Imperial Botanical Garden, Keijo, Japan.

*U. serotina* Sarg.  $n = 14$

Tree ST-305 of accession NA 18375. Source unknown. Tree now 35 feet tall.

#### PLATANUS

The earliest cytological study in *Platanus* was made by Winge (1917), who reported  $n = 21$  for *P. orientalis* L. However, Pizzolongo (1958) has determined that Winge's specimen was not oriental plane but *P. × acerifolia* (Ait.) Willd., the putative hybrid or hybrid derivative of the cross between *P. orientalis* and *P. occidentalis* L. Later interpretations of  $n = 8$  (Brouwer, 1924) and  $n = 10-11$  (Bretzler, 1924), for *Platanus* species have been shown to be incorrect: Sax (1933b) found  $n = 21$  in both *P. occidentalis* and *P. × acerifolia* and Pizzolongo (1958) reported that *P. orientalis* was also a diploid with  $n = 21$ ,  $2n = 42$  chromosomes.

The chromosome numbers of individuals of the above species were checked and, in addition, the following counts were made:

*P. mexicana* Moric.  $2n = 42$

Seedling plant (NA 29764) supplied by L. Lowrey, Houston, Texas, in 1967. Grown from seed collected at Horse-tail Falls, south of Monterey, Mexico.

*P. occidentalis* var. *glabrata* (Fern.) Sarg.  $2n = 42$

Seedling plant (NA 29763) supplied by L. Lowrey, Houston, Texas, in 1967. Grown from seed collected along Blanco River in central Texas.

*P. racemosa* Nutt.  $2n = 42$

Seedlings raised from seedlot NST-32, collected by J. Dourley, Rancho Santa Ana Botanic Garden, Claremont, California, in 1968.



*P. wrightii* Wats.

$2n = 42$

Seedlings raised from seedlot NST-106, collected by W. E. Earle in the New River Mountains, Arizona, in 1968.

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